Notice of Allowability	Application No.	Applicant(s)	
	10/650,035	ISEKI ET AL.	
	Examiner	Art Unit	
	Ling-Siu Choi	1713	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *04/11/2006*.

2. ☒ The allowed claim(s) is/are *9-16*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 4/10/2006
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

1. The request filed on April 11, 2006 for a Request for Continuous Examination (RCE) under 37 CFR 1.17(e) based on parent Application No. 10/650,035 is acceptable and the RCE has been established.

2. This Office action is in response to the Amendment filed April 17, 2006. Claims 1-8 were canceled and claims 9-16 have been added.

Allowable Subject Matter

3. Claims 9-16 are allowed.

4. The following is an examiner's statement of reasons for allowance:

The present claims are allowable over the closest references: Dall'occo et al. (US 5,849,653), Tsutsui et al. (US 5,374,700), and Kanda et al. (US 5,700,895 ≅ EP 0 640 627 A1).

A copolymer of ethylene and α-olefin (C_{4-20}) having		summary of claim 9
A	melt flow rate (MFR)	**1.4-10 g/10 min**
B	melt tension at 190°C (MT)	
C	intrinsic viscosity ([η])	
D	chain length A	
E	melt flow rate ratio (MFRR)	60 or more
F	activation energy for melt flow	**54 kJ/mol or more**
wherein $2 \times MFR^{-0.59} < MT < 20 \times MFR^{-0.59}$ $1.02 \times MFR^{-0.094} < [\eta] < 1.50 \times MFR^{-0.156}$ $3.30 < \log A < -0.0815 \times \log(MFR) + 4.05$		
MFR - measured at 190°C under a load of 21.18 N according to JIS K7210-1995; MFRR - calculated by dividing a melt flow rate measured at 190°C under a load of 211.82 N by a melt flow rate measured under a load of 21.18 N according to JIS K7210-1995		

A copolymer of ethylene and α-olefin (C_{4-20}) having		summary of claim 10
A	melt flow rate (MFR)	**1.4-10 g/10 min**
B	melt tension at 190°C (MT)	
C	intrinsic viscosity ([η])	
D	characteristic relaxation time at 190°C (τ)	
E	melt flow rate ratio (MFRR)	60 or more
F	activation energy for melt flow	**54 kJ/mol or more**
wherein $2 \times MFR^{-0.59} < MT < 20 \times MFR^{-0.59}$ $1.02 \times MFR^{-0.094} < [\eta] < 1.50 \times MFR^{-0.156}$ $2 < \tau < 8.1 \times MFR^{-0.746}$		
MFR and MFRR – defined in claim 9		

Dall'occo et al. disclose a copolymer of ethylene and butene, being obtained in the presence of hydrogen and a catalyst comprising (A) a bridged cyclopentadienyl compound of titanium, zirconium, or hafnium, (B) an organometallic aluminum compound of the formula of $Al(CH_2\text{-}CR^4R^5R^6)wR^7{}_yH_z$, and (C) water, wherein the cyclopentadienyl compound is rac-ethylene-bis(indenyl)zirconium dichloride (abstract; Example 12). Dall'occo et al. further disclose that poly(ethylene-co-butene) has [η] of 1.29 dl/g (Table 2). It is noted that the contact of component (B) and component (C) leads to the formation of PMAO. In view of the comparative example 5, wherein PMAO is used as a cocatalyst, the results are shown as follows,

comparative example 5 [SiO_2 - PMAO]				
			claim 9	claim 10
MFR	log A	τ	3.30 < **log A < -0.0815 x log (MFR) + 4.05**	$2 < \tau < 8.1$ **x** $\mathbf{MFR^{-0.746}}$
2.23	4.05	5.9	3.30 < **4.05 > 4.02**	2 < **5.9 > 4.45**
			not meeting	not meeting

Thus, the use of PMAO will not lead to a polymer product having the specific properties which meet the claimed relationship. Furthermore, Dall'Occo et al. disclose that F/E is in the range of 21.7-38.3, which falls off the claimed range of 60 or more [F/E = MFRR]. Thus, Dall'Occo et al. do not teach or fairly suggest the claimed copolymer of ethylene and α-olefin of 4 to 20 carbons.

Tsutsui et al. disclose an ethylene copolymer comprising ethylene and α-olefin

having 3 to 20 carbon atoms, the ethylene copolymer having MFR of 0.001-50 g /10 min (claim 1). Tsutsui et al. further disclose that the ethylene copolymer is obtained in the presence of a catalyst comprising (A) a transition metal compound having at least two ligands of cyclopentadienyl skeleton, which is bonded together through a (substituted) alkylene group, and (B) an organoaluminum oxy compound (col. 5, lines 15-60; col. 19, lines 19-68; col. 20, lines 1-48; col. 27, lines 43-52; Table 1). In view of the comparative example 5,

comparative example 5 [SiO_2 - PMAO]				
			claim 9	claim 10
MFR	log A	τ	3.30 < **log A < -0.0815 x log (MFR) + 4.05**	$2 < \tau < 8.1 \times MFR^{-0.746}$
2.23	4.05	5.9	3.30 < **4.05 > 4.02**	2 < **5.9 > 4.45**
			not meeting	not meeting

Thus, the use of organoaluminum oxy compound (PMAO) will not lead to a polymer product having the specific properties which meet the claimed relationship. Thus, Tsutsui et al. do not teach or fairly suggest the claimed copolymer of ethylene and α-olefin of 4 to 20 carbons.

Kanda et al. disclose an ethylene-α-olefin copolymer obtained in the presence of a catalyst comprising a titanium compound having at least one titanium-nitrogen bond, a halogen-containing aluminum compound, and an organomagnesium compound (col. 4, lines 51-62; col. 7, lines 10-31; col. 8, lines 22-35; Example 1). In view of Examples 1-2 and the Comparative Examples 1-3, the data of MFR and E_a are shown as follows,

	present claims	Ex. 1	comp. Ex. 1	Ex. 2	comp. Ex. 2	comp. Ex.3
MFR (g/10 min)	1.4-10	3	2	**1**	**1**	**1**
E_a (kJ/mol)	≥ 54	**47**	**29**	78	**29**	**33**

It is noted that the activation energy of flow (E_a) is in the unit of J/mol K. In view of col. 11, lines 52-58, the activation energy of flow is measured by the following steps: "Reciprocal of T is plotted on the axis of abscissa and natural logarithm of a_T at said temperature is plotted on the axis of ordinate to draw an approximate straight line. The inclination of the straight line formed thereby is multiplied by the gas constant (R) and the absolute value of the value obtained thereby is taken as the activation energy of flow E_a (J/mol K)." According to such procedure, the unit should be in J/mol instead of J/mol K. Thus, the ethylene-α-olefin copolymer does not have both MFR and E_a falling into the claimed values. Furthermore, the ethylene-α-olefin copolymer is prepared in the presence of a catalyst other than a metallocene. In conclusion, Kanda et al. does not teach or fairly suggest the claimed copolymer of ethylene and α-olefin of 4 to 20 carbons.

In light of the above discussion, it is evident as to why the present claims are patentable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on

Statement of Reasons for Allowance."

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling-Siu Choi whose telephone number is 571-272-1098.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reach on 571-272-1114.

LING-SUI CHOI
PRIMARY EXAMINER

June 15, 2006